

RESULTS OF A SURVEY OF DAMAGE CAUSED BY THE
CARPENTER BEE *XYLOCOPA VIRGINICA*
(HYMENOPTERA: ANTHOPHORIDAE)

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Abstract.—One hundred and forty-six persons in the Washington, D.C., area returned questionnaires which concerned *Xylocopa virginica* (L.). The bees nested in porches, houses, garages, sheds, fences, benches, trellises, lamp posts, and other wooden structures. They nested more frequently in pine and redwood than in other woods and in south sides of buildings more often than expected by chance alone. Forty-three percent of the respondents were concerned about being stung by the bees. In attempts to control or kill them, 48 persons spent from \$0.10 to 1400.00 (\bar{x} = \$83.67). They reported an average of eight nest entrances per aggregation and an average nest site longevity of six years. Nests were from 0.3 to 9.1 m above the ground.

Xylocopa virginica (L.) is found from Wisconsin east to Maine and south to Florida and Texas (Hurd, 1956). Some persons in the Washington, D.C., area call this large, conspicuous bee the "king bee." Balduf (1962) reviewed its biology, Gerling and Herman (1978) made further studies of its biology, and Hurd (1978) published an annotated bibliography concerning it. In an attempt to locate many nests of this bee, I placed a notice in the "Action Alert" column of the *Washington Star* Newspaper in April, 1978, when *X. virginica* was active outside of its nests. Three hundred and twenty persons in the Washington, D.C., area responded to the notice. I spoke with 80 of these persons on the telephone. Because they accurately described this bee, its nest entrances, and some behaviors, and usually wanted to know more about it, I sent all respondents an information sheet on this bee and a one page questionnaire concerning their observations. This paper pertains to the respondents' answers to the questionnaires.

MATERIALS AND METHODS

The information sheet sent to each person briefly outlined the life history of *X. virginica*, described the hesitancy of the female to sting and the mild-

ness of the sting, and suggested that the bees should not be killed unless it were absolutely necessary. Sevin® (carbaryl) was suggested for control of this bee. The questionnaire requested this information: Name of person responding, age if under 18 years, location of the reported nesting sites, sides (north, south, etc.) of the buildings in which nests were found, type of wood in which bees were nesting, heights (in feet) of highest and lowest nests, numbers of nest holes at each site, number of years that bees nested at a particular site, measures used to control the bees, and cost of bee control attempts (optional). Further, I asked whether or not the respondent was concerned about being stung by the bees before hearing from me. If anyone wished to send me a specimen for confirmation of its identity, I suggested that it be killed by freezing, wrapped in cotton, and returned with the questionnaire. A stamped, self-addressed envelope was sent with each questionnaire. Respondents sometimes expressed their answers in ranges such as from 10 to 20 bee nests and from \$20 to \$30. In reporting their answers, I have used the lowest values; thus, the numerical results in this paper may be biased toward low values. Any answers about which respondents expressed uncertainty were omitted from this paper.

RESULTS AND DISCUSSION

Three hundred and twenty questionnaires were sent, and 146 were returned. Four questionnaires from persons who seemed to confuse *X. virginica* with other Hymenoptera were not used. Seven persons sent specimens which were all *X. virginica*; two persons also sent photographs of nesting sites and wood dust from bee excavations. All respondents were 18 years old or older. Sample sizes in this paper vary because many persons did not send back questionnaires with all questions answered, gave more than one answer to a question, or did both.

One hundred and fifty-five locations of nesting sites were reported. Twenty percent were in porches; 18.7% in eaves of houses; 14.8% in fascia boards of houses or other buildings; 14.2% in garages, sheds, and carports; 13.5% in wooden fences; 12.9% in parts of houses such as steps, decks, and window trim; and 5.8% in wood of objects such as benches, trellises, and lamp posts. The population size of *X. californica arizonensis* Cresson is limited chiefly by availability of nesting substrate and food (Smith and Whitford, 1978), but the effects of these factors on *X. virginica* population sites have not been studied.

Respondents reported from 1 to 40 nest entrances (\bar{x} = 8.4, S.D. = 6.71, N = 71 reports). Particular nesting sites were used for from 1 to 20 yr (\bar{x} = 6.4, S.D. = 4.58, N = 106 sites). Single nests and groups of nests were from 0.3 to 9.1 m above the ground.

Based on 174 reports, 34.5% of the nesting sites were in south sides of

buildings; 26.4% in east sides; 20.1% in west sides; and 19.0% in north sides. By chance alone, one would expect 25% of the nesting sites in each side of buildings, assuming that all sides have appropriate nesting substrates. Nesting in south sides was significantly higher than expected ($P < 0.001$); east sides not different from expected ($P > 0.05$); and west and north sides significantly lower than expected ($P = 0.029, 0.007$, respectively, test for equality of two percentages, Sokal and Rohlf, 1969). Also, there were 14 reports of nests in southeast (50.0%), southwest (28.6%), northwest (14.3%), and northeast sides (7.1%). The tendency of the carpenter bees to nest in south sides more than would be expected by chance alone may be related to their thermoregulation; they probably warm up on cool days more quickly on south sides than on other sides. In the andrenid bee *Andrena vaga* Panzer, individuals which nest in southeast-facing slopes of dikes in Holland become active earlier in the spring and in the morning and cease activity earlier in the afternoon than *A. vaga* which nest in west-facing slopes (Vleugel, 1947). Michener et al. (1958) report a tendency for bees to nest in earthen banks in Brazil which receive maximum insolation; in this case, the banks faced north.

There were 115 reports of the types of wood in which bees nested; 47.8% were in pine (28.7% white pine; 15.7% unspecified pine; 2.6% knotty pine; 0.8% yellow pine); 29.6% in redwood; 13.9% in fir; 5.2% in cedar; 2.6% in oak; and 0.9% in spruce.

Forty-eight persons spent from \$0.10 to \$1,400.00 ($\bar{x} = 82.67$, S.D. = 245.127) in attempts to kill the bees, stop their nesting, or both. Three persons spent over \$200. One person spent \$1,000 to creosote his house to stop both bees and termites, and another person said that he spent \$1,400 for aluminum siding to stop bee nesting. Persons who tried to control the bees used insecticides (in 69 cases), materials to plug nest entrances (sometimes combined with painting and insecticides) (17), swatting (8), pest control services (6), catching and killing (1), and water from the garden hose (1). One man reported that he contacted three pest control services, but none would guarantee to get rid of the bees.

Forty-three percent of 141 persons indicated that they were concerned about being stung by carpenter bees. Significantly more women (51.4% of 70) than men (28.1% of 71) admitted that they were concerned about this matter ($P > 0.001$). Several persons attempted to keep their children or dogs out of places where the bees flew. Four persons seemed to confuse *X. virginica* with other hymenopterans, e.g. bumble bees, which can sting more severely. One woman told me on the telephone that a "carpenter bee" attacked her daughter, stung her on the arm, and caused marked swelling of her arm. Another woman reported that a "carpenter bee" stung her five times in the hand and that she had to be hospitalized because of her allergic reactions to the stings. I have worked around nesting sites of *X. virginica*

for 4 years, but have never seen them attack and sting. The only time when I was stung occurred when I held a female carpenter bee in my hand. Also, no complaints of stinging by this bee are found in the literature (Balduf, 1962).

In addition to possible stinging, the bees annoyed persons by defacing and possibly weakening buildings with nests, making noise during burrowing, staining sides of buildings with defecations, flying too near these persons or their guests, and attracting woodpeckers which made holes in buildings in search of bees to eat. Five persons reported woodpecker damage, one person saw a yellow-shafted flicker at bee nests, and another person saw a red-bellied woodpecker there. Although most persons complained about the bees, seven respondents wrote one or more paragraphs about their fascination with them and described aspects of the bees' biology.

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